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TO NFO

CITE 7815

CORONA

REF A: 3860

REF B: 3934

SUBJECT: MISSION 1108, PHOTOGRAPHIC EVALUATION INTERIM REPORT (PEIR)

1. NUMERICAL SUMMARY:

MISSION NO & DATES: 1108-1, 4 DECEMBER - 11 DECEMBER 1969

RECOVERY 11 DECEMBER 1969/2355Z

1108-2, 11 DECEMBER - 21 DECEMBER 1969

RECOVERY 21 DECEMBER 1969/2130Z

LAUNCH DATE & TIME: 4 DECEMBER 1969/2138Z

VEHICLE NO: 1655

CAMERA SYSTEM: CR-9

PAN CAMERAS: AFT LOOKING 316, FILM TYPE 3404, SO-242

FWD LOOKING 317, FILM TYPE 3404

DISIC UNIT: 012

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STELLAR LENS: PORT F/2.8, 1.5 SEC, NO FILTER

STARBOARD F/2.8, 1.5 SEC, NO FILTER

FILM TYPE: 3401

TERRAIN LENS: F/6.3, 1/500 SEC, W/12 FILTER

FILM TYPE: 3400

RECOVERY REVS: MISSION 1108-1, REV 115

MISSION 1108-2, REV 276

LAUNCH WINDOW: 2130Z TO 2225Z

2. CAMERA SETTINGS:

FWD LOOKING: WRATTEN W/25 (PRIMARY)

WRATTEN W/25 (ALTERNATE)

SLIT WIDTH POS 1 - 0.141 INCHES (MEASURED)

POS 2 - 0.214 INCHES (MEASURED)

POS 3 - 0.274 INCHES (MEASURED)

POS 4 - 0.334 INCHES (MEASURED)

FAIL SAFE - 0.237 INCHES (MEASURED)

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AFT LOOKING: WRATTEN W/21 (PRIMARY)

WRATTEN W/2B (ALTERNATE)

SLIT WIDTH POS 1 - 0.084 INCHES (MEASURED)

POS 2 - 0.140 INCHES (MEASURED)

POS 3 - 0.185 INCHES (MEASURED)

POS 4 - 0.289 INCHES (MEASURED)

FAIL SAFE - 0.154 INCHES (MEASURED)

3. PERFORMANCE SUMMARY: [redacted] REPORTED THE PI SUITABILITY OF MISSION 1108 RANGED FROM FAIR TO GOOD AND THAT THE REDUCTION IN SCALE BECAUSE OF HIGHER THAN NORMAL MISSION ALTITUDE(AFTER PASS D40) REDUCED THE EFFECTIVENESS OF THE MISSION. A SCALE COMPARISON WAS MADE BY MEMBERS OF THE PET FOR ALTITUDES OF 80, 90 AND 100 MILES AND THE EFFECTS OF A 10 PERCENT ALTITUDE CHANGE COULD EASILY BE DISTINGUISHED. ALTHOUGH BOTH THE 1108-1 AND 1108-2 MIP FRAMES WERE SELECTED FROM THE FORWARD LOOKING CAMERA, THE GENERAL IMAGE QUALITY OF THE FORWARD LOOKING CAMERA IS POORER THAN THAT OF THE AFT LOOKING CAMERA.

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SMEARED IMAGES ON THE FORWARD CAMERA ARE DETECTABLE WHERE THE WIDER EXPOSURE SLITS WERE REQUIRED. THIS SMEARING IS MOST NOTICEABLE ON THE TAKE-UP SIDE OF THE FORMAT. THE LARGEST UN-COMPENSATED MOTION EXISTS ON THE TAKE-UP SIDE OF THE FORWARD CAMERA. WHERE ILLUMINATION LEVEL PERMITTED USING NARROW SLITS, THE SMEARING AFFECT IS NOT READILY OBSERVABLE IN THE IMAGERY.

THE MIP OF 105 FOR MISSION 1108-1 WAS ACHIEVED AT AN ALTITUDE OF 82 NM WITH AN MIP OF 100 ACHIEVED IN MISSION 1108-2 FROM AN ALTITUDE OF 100 NM. THESE MIPS ARE THE HIGHEST ACHIEVED BY A CORONA SYSTEM FOR A LAUNCH NEAR THE WINTER SOLSTICE. NO CORN TARGETS WERE ACQUIRED FOR EVALUATION ON MISSION 1108.

THE PET FELT THAT THE INFLIGHT PERFORMANCE OF THE AFT CAMERA WAS EXTREMELY GOOD WHEN CONSIDERING LABORATORY PERFORMANCE, ALTITUDE AND TIME OF YEAR. THE FORWARD CAMERA HOWEVER, WAS NOT PERFORMING TO PEAK POTENTIAL THROUGHOUT MOST OF THE MISSION.

4. PAN CAMERA ANOMALIES

A. ANOMALY - APPROXIMATELY 35 PERCENT OF THE DATA BITS ON

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THE AFT LOOKING CAMERA ARE BLOOMED WITH EACH DATA BLOCK EXPOSURE THROUGHOUT THE MISSION.

CAUSE - DURING READINESS TESTING AT [redacted] THIS BLOOMED CONDITION WAS NOTED. MICRO-DENSITOMETER TRACES OF THESE BLOOMED BITS INDICATED THEY WERE WITHIN THE DENSITY AND SIZE SPECIFICATIONS AND THEREFORE ACCEPTABLE. THE BITS VARY IN SIZE FROM APPROXIMATELY 8 TO 10.3 MILS. THIS IS A GREATER VARIATION THAN PREVIOUS MISSIONS, BUT PROBABLY COULD HAVE BEEN USED SUCCESSFULLY IF REQUIRED.

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NO COPY OF THE FILM WAS MADE FOR DATA BLOCK READING SINCE THE TAPE RECORDER DATA PROVIDES THE PRIMARY SOURCE OF TIME CORRELATION ON THE CORONA SYSTEM. THE DATA BLOCK IS USED ONLY IF A TAPE RECORDER FAILURE OCCURS. NO ACTION ITEM IS ASSIGNED.

B. ANOMALY - ON INSTRUMENT 316 A HEAVY, DIAGONAL CREASE WITH ASSOCIATED EMULSION LIFTS AND PLUS DENSITY MARKINGS EXTENDS APPROXIMATELY 15 INCHES WITHIN THE FORMAT ON FRAME 47 OF PASS D199. IMAGERY IN THE AREA OF THE CREASE INDICATES THIS ANOMALY OCCURRED AFTER

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PHOTOGRAPHIC SCAN.

CAUSE - THE CREASE OCCURRED DURING DEFILMING AND PRESPLICE OPERATION AT EK. NO SPECIFIC ACTION IS ASSIGNED.

C. ANOMALY - ON INSTRUMENT 317 A FOG PATTERN IS PRESENT ON THE FOURTH FRAME FROM THE END OF ALL CAMERA OPERATIONS. THE DENSITY OF THIS FOG PATTERN IS COMMENSURATE WITH CAMERA SIT PERIODS; AFTER A THREE REV SOAK, FOG DENSITY IN THE ORIGINAL NEGATIVE MEASURED 1.1 ABOVE THE BASE LEVEL.

CAUSE - THIS LIGHT LEAK APPEARS TO ORIGINATE IN THE DRUM OF INSTRUMENT 317 AND IS IMAGED ON THE MATERIAL AT THE INSTRUMENT EXIT ROLLER. NO SPECIFIC ACTION IS ASSIGNED.

D. ANOMALY - AN EXTRA PORT HORIZON IMAGE IS PRESENT WITH FRAME 35 OF PASS D95. THE EXTRA HORIZON IMAGE IS OVERLAPPED TO A SMALL EXTENT WITH THE STARBOARD HORIZON IMAGE ASSOCIATED WITH FRAME 34 OF PASS D95. NO FIDUCIALS ARE ASSOCIATED WITH THIS EXTRA HORIZON.

CAUSE - THE HORIZON CAMERA SHUTTERS FOR EACH MAIN INSTRUMENT ARE

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ACTUATED BY ROTARY SOLENOIDS CONNECTED IN PARALLEL THROUGH A DUAL CONTACT RELAY. THESE SOLENOIDS RECEIVE THEIR 24V UN-REGULATED POWER THROUGH THE CENTER OF FORMAT SWITCH IN SERIES WITH THE HALF REV CAM SWITCH, AS WELL AS THROUGH ONE SET OF CONTACTS ON THE RELAY. THE OTHER SET OF CONTACTS PROVIDES POWER TO THE HORIZON CAMERA FIDUCIAL LAMPS. A REVIEW OF THE ASSOCIATED CIRCUITRY INDICATES THAT THIS ANOMALY COULD NOT HAVE OCCURRED. ALL HORIZON CAMERA SHUTTER OPERATIONS, PRECEDING AND FOLLOWING THIS ANOMALY, WERE NORMAL. THE MINOR OVERLAP CONDITION OF THIS EXTRA HORIZON IMAGE DOES NOT INTERFERE WITH NORMAL HORIZON ARC MEASUREMENTS AND NO SPECIFIC ACTION IS ASSIGNED.

E. ANOMALY - A MINUS DENSITY LINE WITH PARALLEL PLUS DENSITY BANDS APPEARS INTERMITTENTLY THROUGHOUT BOTH FORWARD AND AFT RECORDS OF BOTH PARTS OF THE MISSION. THESE BANDS ARE GENERALLY AT A SLIGHT BIAS REFERENCED TO THE FILM WIDTH. THE BANDS SOMETIMES HAVE A BROWNISH APPEARANCE.

CAUSE - THIS APPEARS TO BE ASSOCIATED WITH FILM MANUFACTURING.

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ACTION ITEM 1108-1: CONFIRM WHETHER THIS BAND WAS CAUSED IN FILM MANUFACTURING. MONITOR

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F. ANOMALY - NUMEROUS COMET-SHAPED MINUS DENSITY SPOTS ARE PRESENT INTERMITTENTLY THROUGHOUT THE FORWARD RECORD OF THE FIRST PART OF THE MISSION.

CAUSE - BECAUSE HEAD/TAIL ORIENTATION OF THE COMETS REVERSE BETWEEN MANUFACTURING SPLICES, WE CONCLUDE THAT THIS OCCURRED IN FILM MANUFACTURING. NO ACTION ITEM IS INDICATED.

G. ANOMALY - INSTANCES OF SEVERE OUT OF FOCUS IMAGERY ARE APPARENT ON FRAMES THREE AND FOUR OF MOST PASSES OF INSTRUMENT 317. THE AREA IS APPROXIMATELY TEN INCHES FROM THE TAKE-UP END OF THE FRAME. THE AMOUNT OF IMAGE DEGRADATION IS DIRECTLY ASSOCIATED WITH LENGTH OF SIT TIME BETWEEN PASSES. ON PASSES WITH SIT TIMES OF ONE REV, THE OUT OF FOCUS IMAGERY IS LESS SEVERE AND IS DIFFICULT TO DETECT. AT LEAST TWO REVS BETWEEN OPERATES ARE NECESSARY FOR CONSISTENT DETECTION.

CAUSE - THE MARKS ARE DIRECTLY ASSOCIATED WITH THE SMALL DIAMETER

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ROLLER IN THE EXTENDED FILM PATH ASSEMBLY AND THE SMALL DIAMETER (BOBBLER) ROLLER IN THE CONSTANT TENSION ASSEMBLY. EXTENDED INOPERATIVE PERIODS TEND TO IMPRESS THESE ROLLERS INTO THE PAYLOAD CAUSING THE MATERIAL TO BE DEFORMED. THIS DEFORMATION IS RETAINED DURING THE PHOTOGRAPHIC SCAN RESULTING IN OUT OF FOCUS IMAGERY OF THESE POINTS. NO SEPARATE ACTION OTHER THAN THE CONTINUING WORK ON IMPROVING FILM FLATNESS IS INDICATED.

H. ANOMALY - THE MALFUNCTION OF THE SLOPE PROGRAMMER WAS NOT DISCUSSED AT THE PET SINCE NO PHOTOGRAPHIC PASSES WERE AFFECTED. THE FAILURE OF THE SWITCH PROGRAMMER WAS ADDRESSED BUT NO EXPOSURE PROBLEMS WERE NOTED ON THE DOMESTIC ORIGINAL NEGATIVE,WHICH WERE AVAILABLE.

I. THE REMAINING ANOMALIES NOTED IN THE 31 MESSAGE WERE CONSIDERED CHARACTERISTIC OF THE SYSTEM AND ALTHOUGH REVIEWED BY THE PET ARE NOT DISCUSSED HEREIN.

5. DISIC CAMERA PERFORMANCE: THE LAST ACQUISITION OBTAINED FROM

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THE INDEX CAMERA WAS FRAME 59 OF PASS 204. THE LAST STELLAR ACQUISITION WAS FRAME 41 OF PASS 204.

THE LAST 150 FEET OF MISSION 1108-2 MATERIAL WAS NOT EXPOSED DUE TO A SYSTEM FAILURE.

POINT-TYPE STAR IMAGES WERE RECORDED IN BOTH STELLAR CAMERAS, BUT FEWER STARS WERE RECORDED ON THIS MISSION THAN ON PREVIOUS MISSIONS. AUTOMATIC STELLAR SOLAR SENSORS WERE NOT ACTIVATED DURING THIS MISSION.

THE INDEX PHOTOGRAPHY IS GOOD AND COMPARES FAVORABLY WITH PREVIOUS MISSIONS.

THE DENSITY OF THE INDEX RECORD VARIED FROM LIGHT TO HEAVY, WITH MOST OF THE MISSION MEDIUM HEAVY. THE INDEX SHUTTER SPEED WAS FIXED AT THE MAXIMUM SPEED (1/500) FOR THE DISIC SYSTEM, THEREFORE THE FORMAT DENSITY CANNOT BE DECREASED BY INCREASING SHUTTER SPEED. IT IS NOTED THAT MANY OF THE HEAVY DENSITY FRAMES WERE EXPOSED OVER ICE AND SNOW. THE PET RECOMMENDS THAT [redacted] INVESTIGATE AN ALTERNATE METHOD FOR PROCESSING THE INDEX FILM TO ACCOMODATE THE WIDE EXPOSURE RANGE ENCOUNTERED IN THE

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THE TERRAIN RECORD (ACTION ITEM 1108-2)

6. DISIC ANOMALIES:

A. ANOMALY - THE DISIC CAMERA FAILED TO OPERATE AFTER FRAME 73 OF PASS 204.

CAUSE - BASED UPON THE AVAILABLE T/M DATA, THE CAUSE OF THIS ANOMALY WAS THE FAILURE OF A COMPONENT IN THE INVERTER. LONGER THAN NORMAL CYCLE TIMES WERE NOTED ON PASS 1 AND BECAME PROGRESSIVELY LONGER UNTIL FAILURE WAS EXPERIENCED. THE CYCLE RATE DATA FROM THE HIVOS TEST IS 9.376 SEC/CYCLE. THE RATE TAKEN FROM PREFLIGHT SLP DATA IS 9.391 SEC/CYCLE. THE RATE TAKEN FROM SLP DATA DURING THE LAST 5 RECOVERED FRAMES IS 9.451 SEC/CYCLE. A SUDDEN REDUCTION IN MOTOR VOLTAGE AS INDICATED BY THE MOTOR VOLTAGE T/M MONITOR, FROM 3.5 TO 2.0 VOLTS ALSO OCCURRED AT FAILURE. SIGNIFICANCE OF T/M DATA: LONGER THAN NORMAL CYCLE TIME CAN RESULT FROM: (1) EXCESSIVE FRICTION LOAD; (2) INCORRECT FREQUENCY OF DC/AC INVERTER OUTPUT VOLTAGE; (3) REDUCED MOTOR TORQUE RESULTING FROM ERRATIC DC/AC INVERTER OPERATION. SUDDEN REDUCTION IN OUTPUT VOLTAGE WITHOUT

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FURTHER DEGRADATION INDICATES AN OPEN CURCUIT ON ONE SIDE OF THE PUSH-PULL INVERTER DRIVE.

(1) TESTS HAVE PROVEN THAT EXCESSIVE FRICTION LOADING DOES NOT INCREASE STRESS ON DC/AC INVERTER COMPONENTS, THEREFORE, IF SUCH A CONDITION EXISTED, IT WOULD NOT HAVE RESULTED IN THE EVENTUAL FAILURE OF THE INVERTER.

(2) HAD INVERTER FREQUENCY SUFFERED A SIMPLE FREQUENCY SHIFT THE SYSTEM WOULD CONTINUE TO OPERATE WITH VARYING CYCLE RATE BUT SUCH VARIATION WOULD NOT ACCOUNT FOR THE REDUCTION IN MOTOR VOLTAGE AT FAILURE.

(3) ERRATIC FREQUENCY CHANGES OF THIS NATURE WHICH CAUSE "BREAK UP" OF THE INVERTER OUTPUT VOLTAGE CAN CAUSE BOTH LOSS OF MOTOR SYNCHRONOUS OPERATION AND FINAL DESTRUCTION OF ONE SIDE OF THE PUSH-PULL OUTPUT DRIVERS DUE TO EXCESSIVE SWITCHING OVER DISSIPATION.

A NUMBER OF INDIVIDUAL COMPONENT FAILURES IN THE INVERTER COULD CAUSE ERRATIC OUTPUT. INASMUCH AS NO INVERTER INTERNAL T/M IS

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AVAILABLE, IT IS IMPOSSIBLE TO PINPOINT WHICH CIRCUIT OR COMPONENT IS RESPONSIBLE. IT IS THEREFORE CONCLUDED THAT AN INVERTER COMPONENT FAILURE OCCURRED.

ACTION ITEM 1108-2 - (1) IT IS RECOMMENDED THAT AN INVERTER BE SUBJECTED TO AN ENVIRONMENTAL TYPE TEST TO DETERMINE IF ENVIRONMENTAL CONDITIONS WERE RESPONSIBLE FOR THE EVENTUAL INVERTER FAILURE. CHANGES, IF ANY TO THE INVERTER, WOULD BE MADE BASED ON THE RESULTS OF THIS TESTING.

(2) CHANGE DISIC FLIGHT PREP/TEST PROCEDURE TO INCLUDE MEASUREMENT OF CYCLE RATE AND OUTPUT OF INVERTER PUSH-PULL CURCUIT.

B. ANOMALY - MINOR DENDRITIC, WAVERING PLUS DENSITY STATIC TRACES AND GRID PLATE STATIC DISCHARGE IN THE PORT FORMAT ARE PRESENT THROUGHOUT THE STELLAR FILM.

CAUSE - THESE MARKS ARE CHARACTERISTIC OF THIS SYSTEM IN SOME PRESSURE AREAS. SEVERITY IS MINOR. SOME CORRELATION BETWEEN MARKING AND PMU OFF WAS NOTED. NO ACTION INDICATED.

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C. ANOMALY - A PLUS DENSITY FLARE-TYPE MARK IS PRESENT IN SOME OF THE STARBOARD FORMATS FROM BOTH MISSION SEGMENTS. THE MARK AFFECTS APPROXIMATELY 8 PERCENT OF THE ACTIVE FORMAT AREA. STAR IMAGERY IS PRESENT WITHIN THE FLARE MARKED AREA. CAUSE - A MINOR SUNLIGHT REFLECTION DURING SOME OPERATIONS IS CONSIDERED THE CAUSE. NO CORRECTIVE ACTION IS WARRANTED. THIS TYPE MARKING HAS NOT BEEN OBSERVED ON PREVIOUS SYSTEMS.

D. ANOMALY - SPOT-TYPE PLUS DENSITY DISCHARGES ARE PRESENT ON THE INDEX FILM ON SEVERAL OPERATIONS OF PASSES 106 THRU 118. CAUSE - THESE SPOT-TYPE STATIC DISCHARGES ARE OF THE SAME CHARACTER AND TYPE THAT APPEARED ON MISSION 1107-2 FILM. SEVERITY IS MINOR. NO ACTION IS INDICATED.

E. ANOMALY - MINOR DENDRITIC AND WAVERING PLUS DENSITY DISCHARGES ARE PRESENT ON THE INDEX FILM.

CAUSE - THESE MARKS ARE CHARACTERISTIC OF THIS SYSTEM IN SOME PRESSURE AREAS. SEVERITY IS MINOR. NO ACTION IS INDICATED.

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7. COMMENTS:

A. MISSION 1108-2 RETURNED 213 FRAMES OF AERIAL COLOR FILM, SO-242, AT THE END OF THE AFT CAMERA SUPPLY. EARLY EVALUATIONS OF THE COLOR MATERIAL FROM THIS MISSION WERE CONDUCTED FROM THE COLOR DUPES AND THE RESULTING COMMENTS WERE GENERALLY NEGATIVE. THE PHOTOINTERPRETERS REPORTED THE PI SUITABILITY OF THE COLOR RECORD AS POOR FOR FIRST PHASE EVALUATIONS BECAUSE OF THE SMALL SCALE AND LOWER RESOLUTION LEVELS. THE PET FELT THAT THE BEST IMAGE QUALITY AND COLOR BALANCE OF THE ORIGINAL SO-242 ARE GOOD, BUT NOTED THAT THERE IS A SIGNIFICANT RESOLUTION LOSS FROM THE ORIGINAL TO THE DUPLICATES. MUCH OF THE SO-242 PHOTOGRAPHY APPEARED TO BE DEGRADED BY HAZE, PARTICULARLY AT THE LOW SOLAR ALTITUDES (LESS THAN 15 DEGREES). THE BEST COLOR IMAGE QUALITY WAS TAKEN AT THE HIGHER SOLAR ALTITUDES (40 DEGREES). THIS COLOR PHOTOGRAPHY IS BETTER THAN ANY OTHER COLOR PHOTOGRAPHY OBTAINED TO DATE FROM THE CORONA SYSTEM, EVEN THOUGH THIS FLIGHT WAS FLOWN AT 15 PERCENT HIGHER ALTITUDE.

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PARTICULARLY NOTABLE WAS THE FINER DYE STRUCTURE OF THE SO-242 MATERIAL WHEN COMPARED WITH SO-121. ELECTROSTATIC FOGGING DOES NOT APPEAR TO BE A PROBLEM WITH SO-242 IN THE CORONA SYSTEM.

END OF MESSAGE

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